

10/019867

531 Rec'd PCT/PT

21 DEC 2001

Attorney Docket No. 70301.56834

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: POLLACK, Steffen
GERLOFF, Martin
ZIMMERMAN, Michael

SERIAL NO. Entry into national stage of PCT/EP00/05559

FILED: Herewith

FOR: METHOD AND DEVICE FOR PRODUCING AN OBJECT BY
MEANS OF STEREOLITHOGRAPHY

BOX PATENT APPLICATION
COMMISSIONER FOR PATENTS
WASHINGTON, DC 20231

Sir:

PRELIMINARY AMENDMENT

Please amend the application as follows.

In the Claims:

Please cancel claims 1-12 and enter the following new claims.

13. A method of producing a three-dimensional object by layer-by-layer solidifying of a material solidifiable under the action of electromagnetic radiation or particle radiation at places corresponding to the cross-section of the object in a layer, said method comprising:

providing a mask-generating device which can be controlled as a function of the cross-section of the object in a respective layer;

generating a mask for selectively transmitting the electromagnetic or particle radiation to areas of a layer to be irradiated using the mask-generating device; and

controlling the intensity of the radiation within areas to be irradiated.

14. The method according to claim 13, further comprising reducing the intensity of the radiation when the area to be irradiated in a layer is located above an area in another layer with non-solidified material.

15. The method according to claim 14, wherein in the reducing step the intensity is reduced in a range of between about 5% and about 60% of an intensity that is required to connect a layer during solidification with the layer located below.

16. The method according to claim 13, further comprising controlling the intensity of the radiation via control of the transparency of the mask.

17. The method according to claim 13, further comprising measuring an intensity profile of the radiation over the layer during irradiation of a layer and using the intensity profile to control the intensity of radiation for the areas in the next layer to be solidified.

18. The method according to claim 13, further comprising providing a transmission LC display with gray scales, using the LC display to generate the mask, and controlling the intensity of radiation via triggering of the gray scales of the LC display.

19. The method according to claim 18, further comprising using visible light as the electromagnetic radiation.

20. The method according to claims 19, further comprising using a polymer which hardens under the action of visible light as a solidifiable material for each layer.

21. The method according to claim 13, further comprising controlling the intensity of the radiation via control of the transparency of the mask;

measuring an intensity profile of the radiation over the layer during irradiation of a layer and using the intensity profile to control the intensity of radiation for the areas in the next layer to be solidified;

providing a transmission LC display with gray scales;

using the LC display to generate the mask; and

controlling the intensity of radiation via triggering of the gray scales of the LC display.

22. The method according to claim 21, further comprising using visible light as the electromagnetic radiation.

23. The method according to claims 22, further comprising using a polymer which hardens under the action of visible light as a solidifiable material for each layer.

24. An apparatus for producing a three-dimensional object by layer-by-layer solidifying of a material solidifiable under the action of electromagnetic or particle radiation at places corresponding to the cross-section of the object, said apparatus comprising:

a radiation source for producing the electromagnetic or the particle radiation,

a platform for carrying the object,

a device for applying a layer of the material to the carrying device or a previously formed layer,

a mask-generating device for generating a mask for selectively transmitting the electromagnetic or particle radiation at the places corresponding to a cross-section of the object in a layer, and

a control device for controlling the mask-generating device, the control device being structured and arranged to control the intensity of the radiation transmitted by the mask as function of a predetermined solidification depth.

25. The apparatus according to claim 24, wherein said radiation source is a light source for visible light and wherein the mask-generating device is a transmission LC display.

26. The apparatus according to claim 25, wherein the LC display has a gray scale resolution.

27. The apparatus according to claim 24, further comprising a deflection device that deflects at least part of the radiation transmitted by the mask, arranged between the radiation source and a detector device for ascertaining an intensity profile of the radiation deflected via the deflection device.

28. The apparatus according to claim 27, wherein said radiation source is a light source for visible light and wherein the mask-generating device is a transmission LC display.

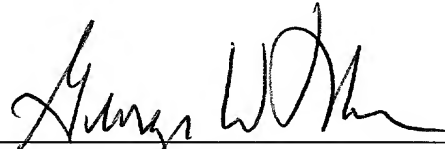
29. The apparatus according to claim 28, wherein the LC display has a gray scale resolution.

REMARKS

Should the Examiner wish to discuss any of the amendments and/or remarks made herein, the undersigned attorney would appreciate the opportunity to do so.

Respectfully submitted,

Date: 21 Dec '11

By: 
George W. Neuner
Registration No. 26,964

Dike, Bronstein, Roberts & Cushman
Intellectual Property Practice Group
EDWARDS & ANGELL, LLP
P.O. Box 9169
Boston, MA 02209
(617) 439-4444

BOS2_186061.1

S. POLLACK, et al.
Page 7 of 9

Appendix showing details of amendment

Claims 1-12 are cancelled.

New claims:

13. A method of producing a three-dimensional object by layer-by-layer solidifying of a material solidifiable under the action of electromagnetic radiation or particle radiation at places corresponding to the cross-section of the object in a layer, said method comprising:

providing a mask-generating device which can be controlled as a function of the cross-section of the object in a respective layer;

generating a mask for selectively transmitting the electromagnetic or particle radiation to areas of a layer to be irradiated using the mask-generating device; and

controlling the intensity of the radiation within areas to be irradiated.

14. The method according to claim 13, further comprising reducing the intensity of the radiation when the area to be irradiated in a layer is located above an area in another layer with non-solidified material.

15. The method according to claim 14, wherein in the reducing step the intensity is reduced in a range of between about 5% and about 60% of an intensity that is required to connect a layer during solidification with the layer located below.

16. The method according to claim 13, further comprising controlling the intensity of the radiation via control of the transparency of the mask.

17. The method according to claim 13, further comprising measuring an intensity profile of the radiation over the layer during irradiation of a layer and using the intensity profile to control the intensity of radiation for the areas in the next layer to be solidified.

18. The method according to claim 13, further comprising providing a transmission LC display with gray scales, using the LC display to generate the mask, and controlling the intensity of radiation via triggering of the gray scales of the LC display.

19. The method according to claim 18, further comprising using visible light as the electromagnetic radiation.

20. The method according to claims 19, further comprising using a polymer which hardens under the action of visible light as a solidifiable material for each layer.

21. The method according to claim 13, further comprising controlling the intensity of the radiation via control of the transparency of the mask;

measuring an intensity profile of the radiation over the layer during irradiation of a layer and using the intensity profile to control the intensity of radiation for the areas in the next layer to be solidified;

providing a transmission LC display with gray scales;

using the LC display to generate the mask; and

controlling the intensity of radiation via triggering of the gray scales of the LC display.

22. The method according to claim 21, further comprising using visible light as the electromagnetic radiation.

23. The method according to claims 22, further comprising using a polymer which hardens under the action of visible light as a solidifiable material for each layer.

24. An apparatus for producing a three-dimensional object by layer-by-layer solidifying of a material solidifiable under the action of electromagnetic or particle radiation at places corresponding to the cross-section of the object, said apparatus comprising:

a radiation source for producing the electromagnetic or the particle radiation,

a platform for carrying the object,

a device for applying a layer of the material to the carrying device or a previously formed layer,

a mask-generating device for generating a mask for selectively transmitting the electromagnetic or particle radiation at the places corresponding to a cross-section of the object in a layer, and

a control device for controlling the mask-generating device, the control device being structured and arranged to control the intensity of the radiation transmitted by the mask as function of a predetermined solidification depth.

25. The apparatus according to claim 24, wherein said radiation source is a light source for visible light and wherein the mask-generating device is a transmission LC display.

26. The apparatus according to claim 25, wherein the LC display has a gray scale resolution.

27. The apparatus according to claim 24, further comprising a deflection device that deflects at least part of the radiation transmitted by the mask, arranged between the radiation source and a detector device for ascertaining an intensity profile of the radiation deflected via the deflection device.

28. The apparatus according to claim 27, wherein said radiation source is a light source for visible light and wherein the mask-generating device is a transmission LC display.

29. The apparatus according to claim 28, wherein the LC display has a gray scale resolution.